

Appl. No. : 10/617,332
Filed : July 10, 2003

IN THE CLAIMS:

Please cancel Claim 13 without prejudice or disclaimer.

1. (Original) A method of forming a bend in a pipe comprising determining a target radius of curvature of the bend, sealing an interior space of the pipe at a desired location of the bend, filling the interior space with a liquid, calculating a target pressure of the liquid as a function of the target radius wherein the target pressure is inversely related to the target radius, pressurizing the liquid to a pressure substantially equal to the target pressure, and manipulating the pipe to form a bend having a radius substantially equal to the target radius.

2. (Original) The method of Claim 1, further comprising determining a target bending angle of the bend, wherein the calculating of the target pressure of the liquid involves consideration of the target bending angle, wherein the target pressure is directly related to the target bending angle, and the manipulating of the pipe is continued until the bend achieves a bending angle substantially equal to the target bending angle.

3. (Original) The method of Claim 2, further comprising increasing the target pressure during the manipulation of the pipe.

4. (Original) The method of Claim 1, further comprising monitoring the liquid pressure during the manipulation of the pipe and maintaining the liquid pressure substantially at the target pressure throughout the manipulation of the pipe.

5. (Original) The method of Claim 1, wherein the target pressure is between about 8 and 30 Megapascals.

6. (Original) A method of forming at least a first and a second bend in a pipe comprising determining a first target radius of curvature of the first bend and a second target radius of curvature of the second bend which is different from the first target radius, creating at least one sealed interior space within the pipe including the locations of the first bend and the second bend, filling the at least one sealed interior space with a liquid, calculating a first target pressure of the liquid for the first bend as a function of the first radius and calculating a second target pressure of the liquid for the second bend as a function of the second radius wherein, if the second target radius is less than the first target radius, the second target pressure is greater than the first target pressure and, if the second target radius is greater than the first target radius, the second target pressure is less than the target pressure of the first bend, pressurizing the liquid to a pressure substantially equal to

the first target pressure and manipulating the pipe to form a first bend having a radius substantially equal to the first target radius, pressurizing the liquid to a pressure substantially equal to the second target pressure and manipulating the pipe to form a second bend having a radius substantially equal to the second target radius.

7. (Original) The method of Claim 6, further comprising determining a first target bending angle of the first bend and a second target bending angle of the second bend, wherein the calculating of the first target pressure and the second target pressure of the liquid involves consideration of the first and second target bending angles, wherein the first target pressure is directly related to the first target bending angle and the second target pressure is directly related to the second target bending angle, and the manipulating of the pipe to form the first bend is continued until the bend achieves a bending angle substantially equal to the first target bending angle and the manipulating of the pipe to form the second bend is continued until the bend achieves a bending angle substantially equal to the second target bending angle.

8. (Original) The method of Claim 7, further comprising increasing the target pressure during the manipulation of the pipe.

9. (Original) The method of Claim 6, further comprising monitoring the liquid pressure during the manipulation of the pipe to form the first and second bends and maintaining the liquid pressure substantially at the respective first or second target pressure throughout the manipulation of the pipe.

10. (Original) The method of Claim 6, wherein the first and second target pressures are between about 8 and 30 Megapascals.

11. (Original) A method of forming a bend in a pipe comprising determining a target angle of curvature of the bend, sealing an interior space of the pipe at a desired location of the bend, filling the interior space with a liquid, calculating an initial target pressure of the liquid as a function of the target angle wherein the initial target pressure is directly related to the target angle, pressurizing the liquid to a pressure substantially equal to the initial target pressure, and increasing the pressure of the liquid from the initial target pressure while manipulating the pipe to form a bend having an angle substantially equal to the target angle.

12. (Original) The method of Claim 11, further comprising increasing the target pressure from the initial target pressure during the manipulation of the pipe.

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13. (Canceled)

14. (Original) The method of Claim 11, wherein the target pressure is between about 8 and 30 Megapascals.

15. (Original) A system for forming a bend in a pipe at a bending position, the system comprising a bending assembly including a pipe bending mechanism and a pressurizing mechanism, the system further comprising a memory and a controller, the pipe bending mechanism including a first roll die having a first radius and a second roll die having a second radius smaller than the first radius and being configured to bend the pipe against a selected one of the first roll die and the second roll die, the bending assembly being configured to position the bending position of the pipe relative to the selected one of the first roll die and the second roll die, the pressurizing mechanism being configured to pressurize a liquid within a sealed interior space of the pipe including the bending position, the memory being configured to store a data set for the bend, the data set comprising a target liquid pressure, a selection of one of the first roll die and the second roll die, and a bending position of the pipe, the controller being configured to process the data set to operate the pressurizing mechanism to pressurize the liquid to a pressure substantially equal to the target pressure and operate the pipe bending mechanism to bend the pipe at the bending position utilizing the selected one of the first roll die and the second roll die, wherein the target liquid pressure is greater for the second roll die than for the first roll die.

16. (Original) The system of Claim 15, wherein the memory is configured to store one or more additional data sets for one or more additional bends.

17. (Original) The system of Claim 16, wherein the memory is configured to store a relative rotational position of the pipe for each additional bend and wherein the bending assembly is configured to rotate the pipe to the rotational position of each additional bend.

18. (Original) The system of Claim 15, further comprising a pressure sensor configured to sense a change in pressure of the liquid within the pipe and send a pressure signal indicative of the change in pressure to the controller, wherein the controller is configured to actuate the pressurizing mechanism to pressurize the liquid to substantially maintain the target liquid pressure during the bending of the pipe.